SIEMENS

Opdima®

SP

Installation

Installation and Start-Up

On MAMMOMAT Novation^{DR} Serial No < 1100

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Document revision level

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Documentation required

- MAMMOMAT Novation^{DR} Wiring Diagram SPB7-250.844.01.03..
- MAMMOMAT Novation^{DR} Startup with WH AWS, from System Serial No. 1101 SPB7-250.815.03...
- Instruction for use
- QC Manual
- MAMMOMAT Novation^{DR} Replacements of parts SPB7-250.841.01.01..
- Software Description V2.1. SPB7-250.816.03.

Auxiliary Materials

- Drill 7 mm
- Drill Machine
- Center punch
- Seeger circlip ring nipper
- PLCC Extractor
- Service PC see the CS Intranet (CS/For Service/Common Services/Service Laptop for CSEs) for details.
- Power ground-wire tester 44 15 899
- Serial Service Cable (Stand) Part No. 99 00 440

Content of the Upgrade Kit Part No 6655984

0010	06646678	BACK COVER CPL	1.000
0020	06622927	LOWER BACK COVER	1.000
0025	06622919	UPPER BACK COVER	1.000
0030	06636661	Holding Plate left	
0040	06636679	Holding Plate right	
0050	06655869	CABLE SOCKET CPL	1.000
0060	06192236	Grip	1.000
0070	05507038	LOCTITE_243	1.000
0080	06248046	Lever axle	1.000
0090	06421494	Lever Bushing	1.000
0100	09026634	Spring 1x9x30 DIN 2098	1.000
0110	06383066	EMC Filter	1.000
0120	03433919	Screws M4x12 DIN 912-12.9 0000	2.000
0130	03416666	Washer 4 SN70093-FST	2.000
0140	03342532	Washer A8.4 DIN 125-ST 6980	1.000
0150	06298637	Transformer 215 VA RONDOLL	1.000
0160	06023980	Screw MC6S6x65 DIN 912	1.000
0170	03342292	Washer A6.4 DIN 125-ST 6980	1.000
0180	06034581	Nut M6NY6 DIN 985	1.000
0240	06659747	PROM kit Master VA00D	1.000
0245	06659762	Software kit V2.1	1.000

0190	06658863	CABLE BRACKET	1.000
0195	06501712	Cable tie SN70764	3.000
0200	06655950	CABLE Z801	1.000
0210	03343829	Cable socket 6.3 - 2.5 DIN 46247 - BRONZE	0.070
0220	06582407	Heat shrink tubing 4.8 SW	
0230	08102415	Label 8 x 17 Paper yellow	7.000
0240	06659747	PROM KIT MASTER PLD VA00D	1.000

Phantom / Auxiliary

Item	Remarks	Material Number	With System
RMI 156		88 81 265	no
One 0.1 mm, two 0.2 mm and one 0.5 mm sheets of aluminium 99 % (1100) alloy, 4 x 4 cm		88 81 273	no
Mammography line pair phantom	2 - 10 lp/mm	88 81 299	no
4.2 cm plexi	Size of the detector	74 47 720	no
Centering cross		96 60 051	no

Symbols

This symbol indicates exposure of X-ray radiation.

This symbol indicates that the measured values have to be entered.

Protective measures

System Power Supply

It is very important that any intervention in the equipment will start with disconnecting it from the power supply with the main circuit-breaker. Before removing or inserting any of the printed circuit boards, switch off the equipment.

⚠WARNING

If the MAMMOMAT Novation^{DR} system is only switched off at the control panel or with the circuit breaker CB S700, there is still voltage present within the generator. See the wiring diagram for MAMMOMAT Novation^{DR}.

Life-threatening electric shock hazard exists.

Disconnect mains cable and comply with the information on this page.

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit of the MAMMOMAT generator.

Life-threatening electric shock hazard exists.

A bleader resistor is connected over the output DC capacitors.

The DC voltage will discharge below 60 Volt in 3 minutes.

The voltage level is indicated by LEDs H3 and H4.

PC Boards

⚠CAUTION

The p.c. boards contain electrostatic highly sensitive components.

If disregarded, the components could be damaged.

Use ESD equipment, ground prior to making contact and place the components on a conductive surface.

Metal Curtain

⚠WARNING	**The edges of the metal curtain of the stand are very sharp.** **They may cause severe injury.** **These strips must always be applied onto the edges of the metal curtain during service and maintenance work.**

Apply the protective strips after removing the covers from the stand. Remove the protective strips only when the covers are to be mounted or when vertical adjustment of the swivel arm system is necessary.

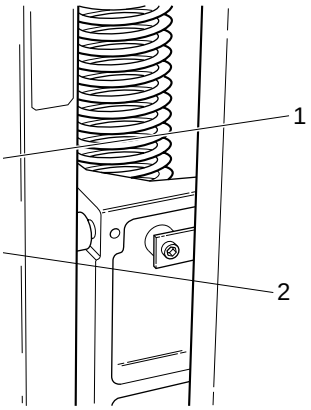

Fig. 1 Protective strips for the metal curtain

Holders (1/Fig.1 and 2/Fig. 1) for storing the protective strips when not in use are provided on both sides of the curtain.

Measurements with the oscilloscope

⚠WARNING

The existing ground conductor in the mains cable must under no circumstances be disconnected when operating the oscilloscope.

A life-threatening hazard of electric shock exists.

For measurements in which a resulting ground loop may falsify the measuring result, use the differential amplifier (difference measurement).

Swivel-arm rotation

⚠WARNING

When rotating the swivel arm with the detector wing in parking position, make sure that the main cable harness does not get damaged. Stop rotation immediately, if the cable harness appears to be extensively pulled.

Service Software

The MAMMOMAT *Novation*^{DR} has various service software packages:

- Acquisition Workstation
  The Acquisition Workstation service software is web-based and can be started from the Options application menu.
- BRICK
  The BRICK service software can be accessed via the Acquisition Workstation.

Delay times between two exposures

The delay times listed below must be followed to prevent the tube from overheating.

Exposure mAs value	Delay time between two exposures (seconds)
max. 100	min. 15
max. 200	min. 30
max. 300	min. 45
max. 400	min. 60
max. 500	min. 75

Tab. 1 Delay times between two exposures

Presettings

NOTE	**All the orientations left and right is always seen from the front of the MAMMOMAT System.**

- Switch ON the MAMMOMAT Novation^{DR} System.
- Connect the Service PC to the stand.
- With the service software revision level V1.0 available at site make a backup of all components. (i.e. of the stand and of the generator. The generator data are stored within the control panel.)
- You may either "copy installation area to disc", or "copy installation area to floppy".
- Label the floppy with "backup with SSW V1.0 / current date".
- If the copy was made to the (hard) disc of the service PC, note down the location where to the data were stored. (This backup may only be needed if some irregularity would occur.)
- Switch OFF the MAMMOMAT System and switch OFF the main power line.

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Covers

- Remove the back cover.
- Remove the back cover service.
- Left front cover.

NOTE	**Attach metal curtain protection.**

- Remove lower and back cover from the detector wing.
- Remove the tube head cover.
- Remove the covers below the bellow.

Lift the generator

NOTE	**The generator has to be lifted to make room for the EMC filter.**

- Loosen the four screws (One turn counter clockwise Fig. 2) fixing the generator to the stand.
- Remove the bottom hinge with the two screws.

NOTE	**The generator will slide down a little.**

- Place the washer 8.4 x16 x1.6 (Pos 140) on the lower hinge axle according to (1/Fig. 1).
- Lift the generator door up and mount the hinge back to its original position.
- Remove the four screws and swing the generator out.

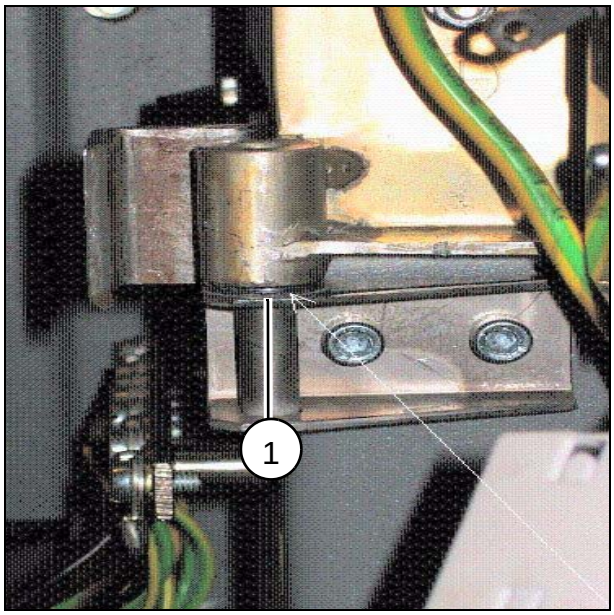

Fig. 1

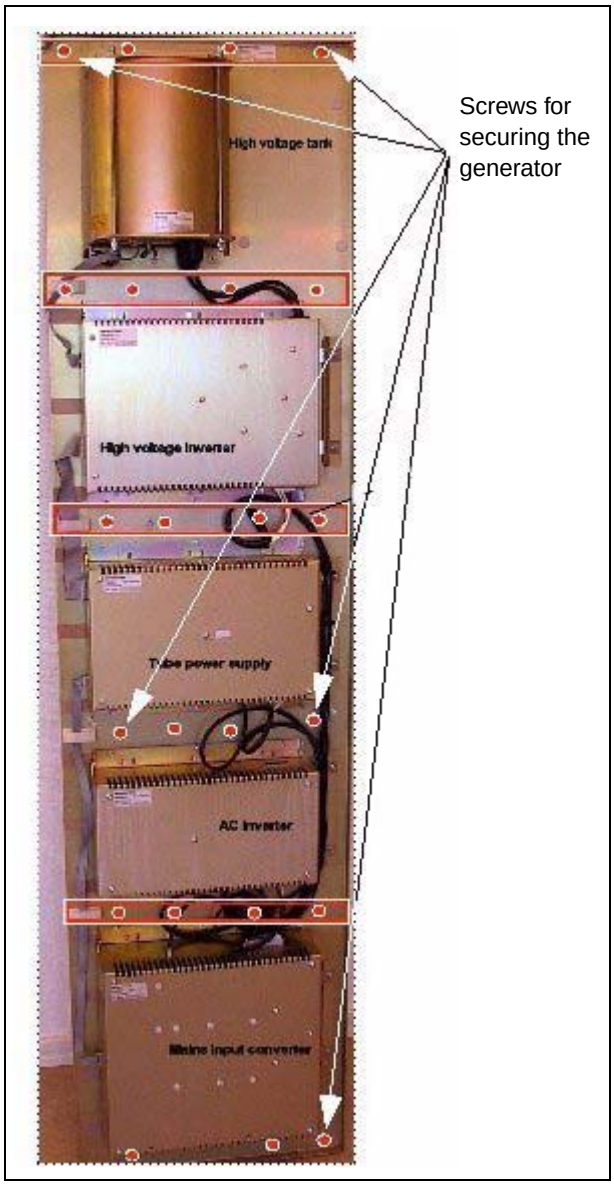

Fig. 2

Transformer

- Drill a hole (ϕ 7 mm) for mounting of the transformer according to Fig. 3 (spring site). See to it that no remnants of the drilling are left inside the stand. For marking the place of the hole a drill template (No: 1) may be used.
- Mount the transformer (Pos 150) inside the stand with a MC6S M6x65 (Pos 160), one washer 6.4 x 12 (Pos 170) and a nut M6M (Pos 180) according to Fig. 3 and Fig. 4. The cable connections pointing downwards. Fasten the label T803 (use one off the yellow labels and write T803 on it) and stick it to the inside off the stand above the transformer.

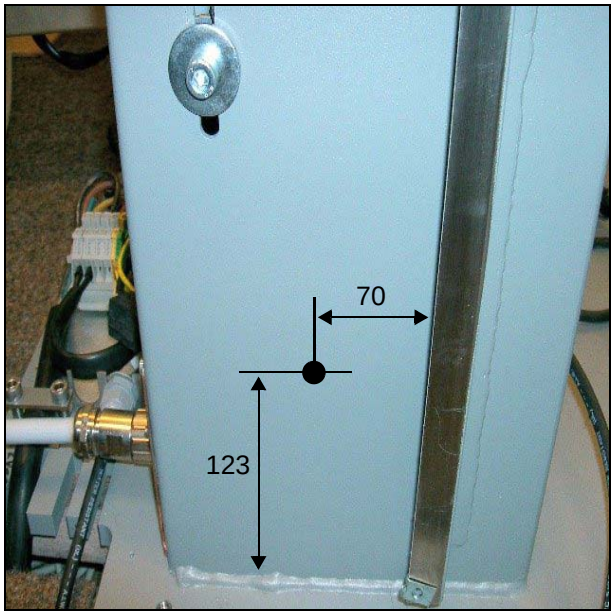

Fig. 3

Fig. 4

Cable Socket

- Dismount the foot pedals strain relieves, the mains cable strain relief and the mains supply connection from the Cable Socket CPL.
- Remove the old Cable Socket CPL.
- Mount the left and right foot pedal strain relieves on the inner positions on the new Cable Socket CPL (Pos 50) according to (1/Fig. 5)
- Install the new Cable Socket CPL.

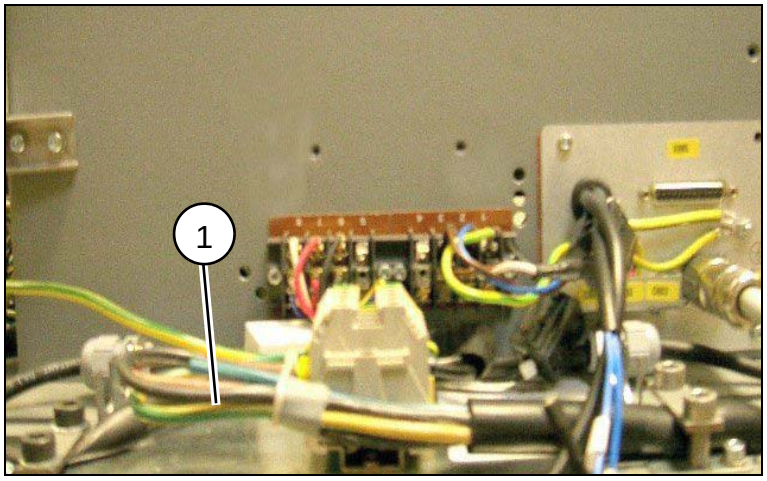

Fig. 5

EMC filter (Z801)

- Mount the EMC filter (Pos. 110) upside down with two MC6S 4 x 12 screws (Pos. 120) and two contact washers (Pos. 130), and fasten the labels according to Fig 6.
- Label 1 to 4, Z801, Z801-1, Z801-2 and Z801 GND.

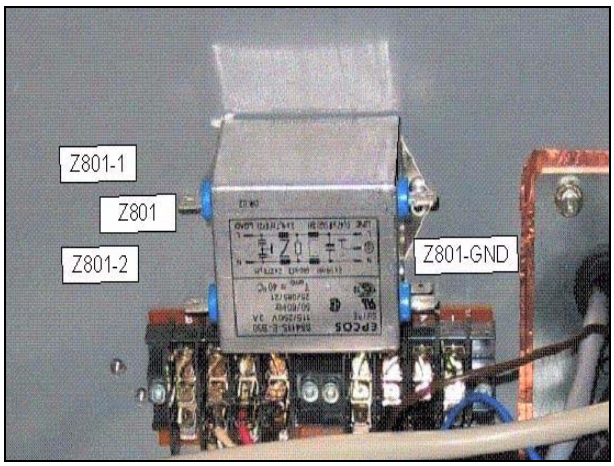

Fig. 6

Cable Z801

- Dismount the D-sub plate.
- Thread the Z801 cable (Pos 200) through the conduit entry according to Fig. 7.
- Restore the D-sub plate. Attach the AMP connector to the transformer inside the stand.

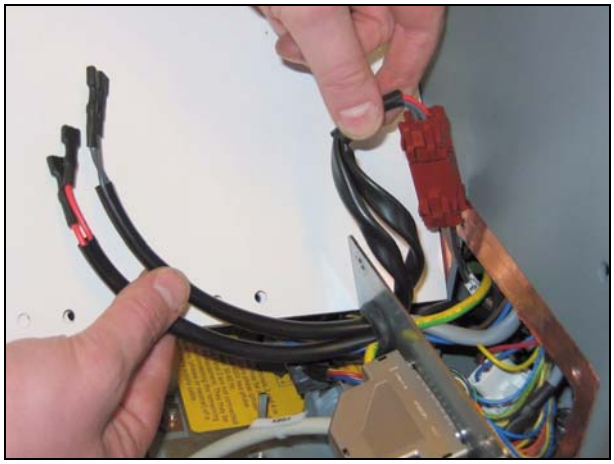

Fig. 7

- Attach the connectors to the EMC filter and to the connector X803 according to markings on the connectors, according to Fig. 8.

NOTE	Use the numbering of terminal contacts on the lower side of terminal row Z 803.

If you don't connect an Opdima® mains cable isolate the outputs 1 and 2 of the filter Z 801 by means of the supplied cable socket and heat shrink tubing in order to prevent electrocution.

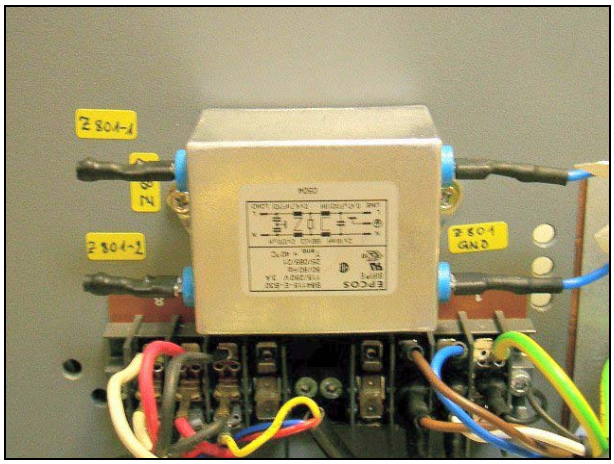

Fig. 8

Cable Bracket

- Remove the Upper Back Cover and Lower Back Cover from the detector.
- Remove the detector (Info in Replacement of parts SPB7-250.841.01.01..).
- Remove the screws holding the bellow. Remove the strain relief from underneath the Flying Wing (detector side). Lift the bellow and replace the old Cable Bracket with the new one (POS 190) according to Fig. 9.

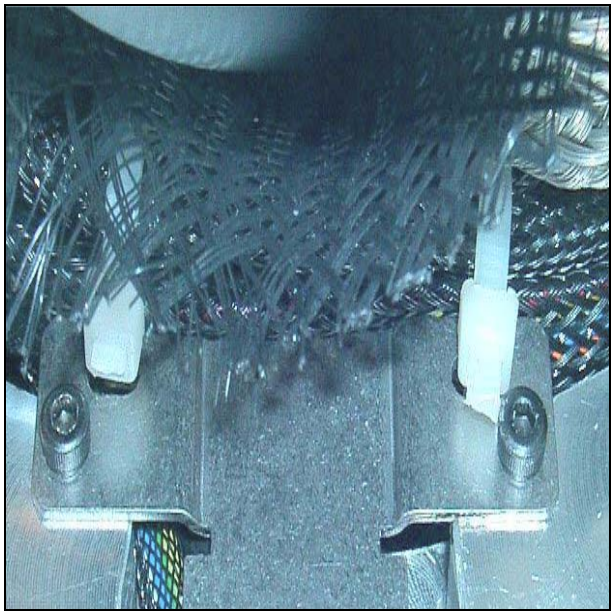

Fig. 9

- Mount two cable ties (Pos 195) according to Fig. 9 and one cable tie according to Fig. 10.

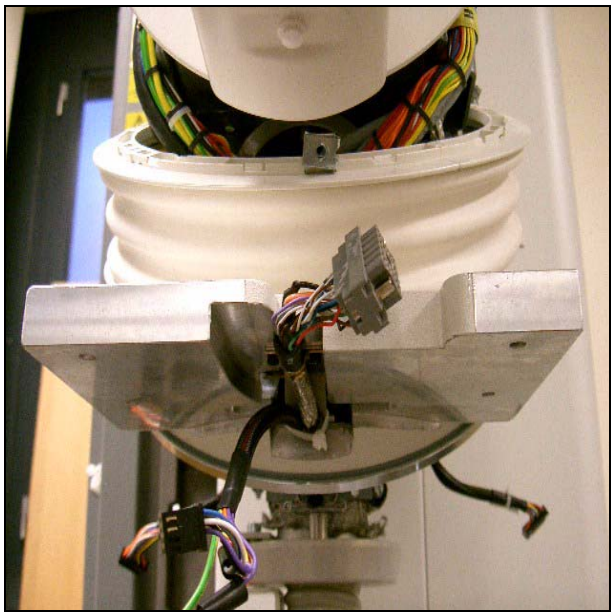

Fig. 10

- Replace the strain relief underneath the Flying Wing on the detector side according to (1/Fig. 11).

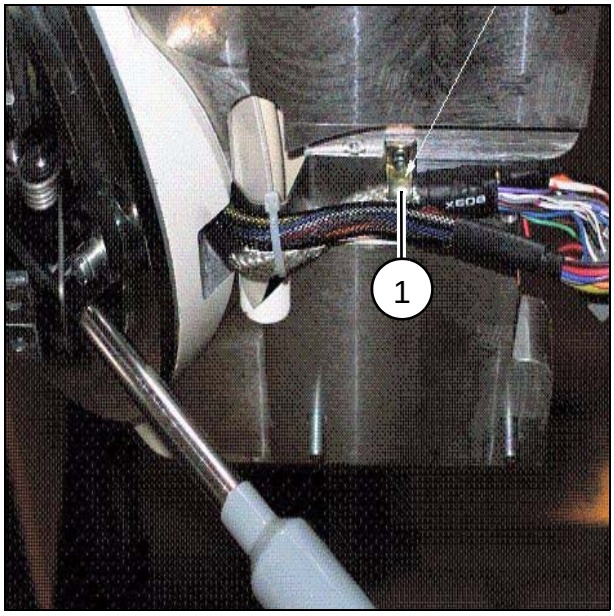

Fig. 11

- Mount the detector base blade.

Flying Wing lever

- Dismount the Clamp Rings (2 spare in the upgrade kit), the Pin and the Torsion Spring according to (1/Fig. 12) and take out the Catch.

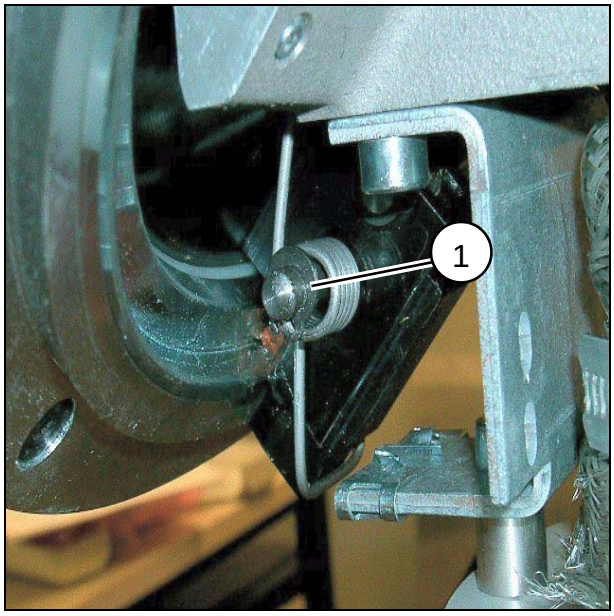

Fig. 12

- Assemble the Lever (Pos 60), Bushing (Pos 90), Axle (Pos 80), Catch and Spring (Pos 70) according to Fig. 13 and Fig. 14 (apply Loctite 243 (Pos 70) on the Axle threads before turning it in to the lever handle.

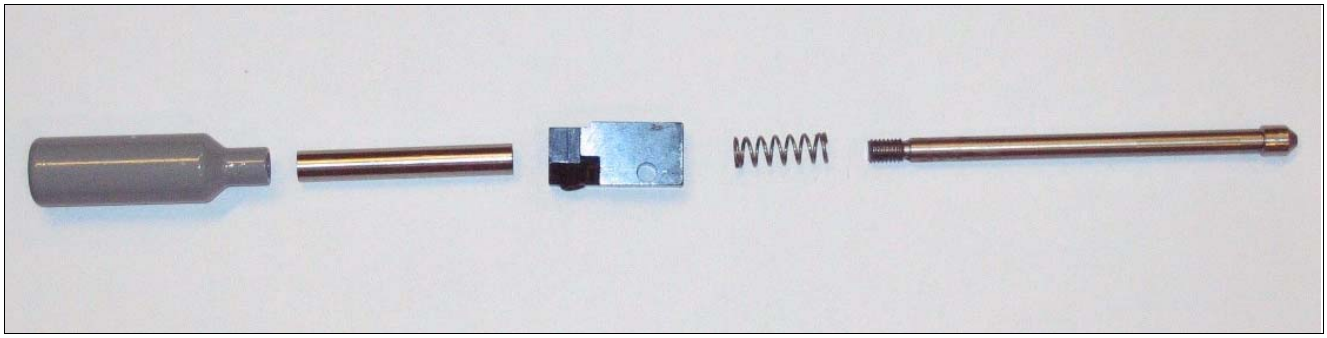

Fig. 13

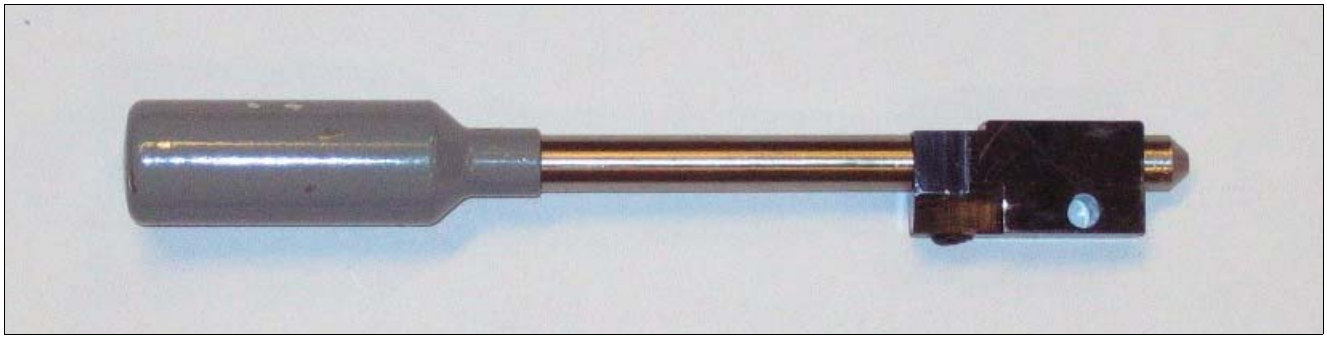

Fig. 14

- Mount the Flying Wing Lever together with the Pin, Torsion Spring and Clamp Rings according to Fig. 15.

Fig. 15

- Reinstalling the Detector
- Remove the existing rails left and right from the Detector wing.
- Remove all the assemblies from the existing rails and reinstall it by the new one (1/Fig. 16).
- Install the new Spring plate according to the (2/Fig. 16).

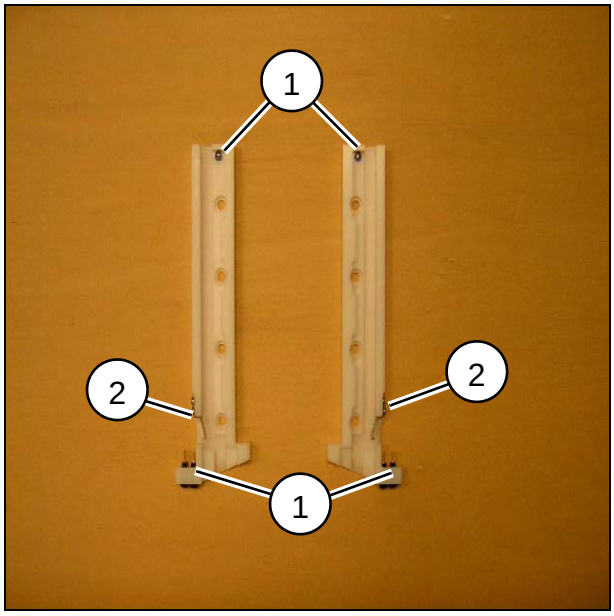

Fig. 16

- Reinstall, i.e. attach both rails back to the Detector wing and reconnect the cables.
- Move the Cover Bracket and the Service Cover from the old Lower Back Cover to the new Lower Back Cover (Pos 20) according to Fig. 17.

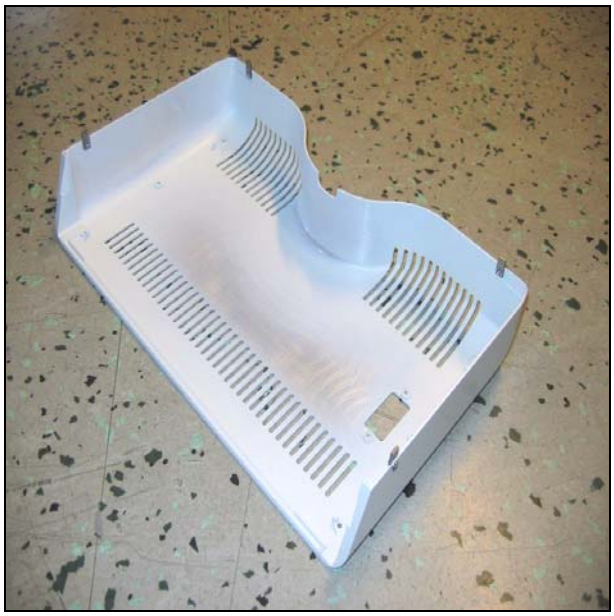

Fig. 17

- Mount the Upper Back Cover and the Lower Back Cover. Notice how the cables run through the new opening on the Lower Back Cover according to Fig 18.

Fig. 18

Software Update V1.0 to 2.1

OPDIMA can only be connected to NovationDR with the FW/SSW revision level V2.1 or higher !!

The actual installation of OPDIMA to a NovationDR can follow only when the NovationDR was already adapted, or if the NovationDR has had a serial number higher than 1100 !

The adaptation of NovationDR includes the Upgrade of the Firmware/ServiceSoftware from revision level V1.0 to revision level V2.1 !

Thereby following has to be exchanged:

On the PC Board D750:

- exchange the IC 62 (MatNo.: 066 59 770), see 3 / Fig. 19.
- exchange the IC 45 (MatNo.: 066 59 796), see 1 / Fig. 19.
- exchange the IC 53 (MatNo.: 066 59 747), see 4 / Fig. 19.
- The IC 52 (MatNo.: 066 59 440), see 2 / Fig. 19 - will remain, as it is.

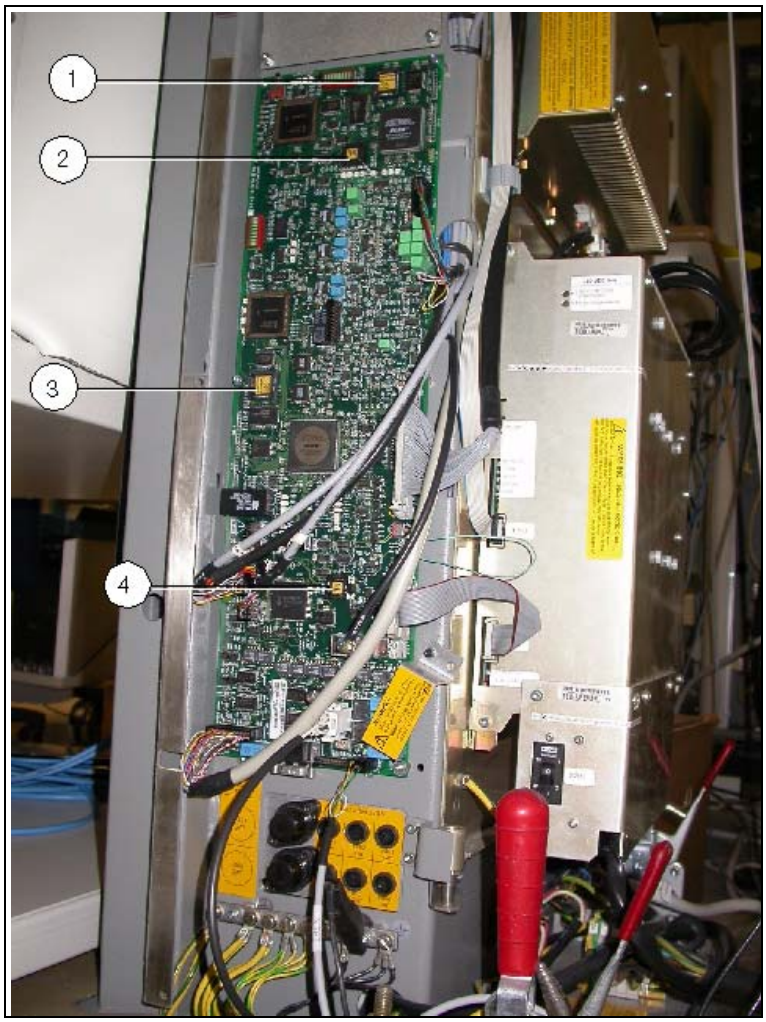

Fig. 19 PCB D750

On the PC Board D801:

- Exchange the IC 9 (MatNo.: 066 59 788).

On the PC Board D740:

- Exchange the IC 10 (MatNo.: 066 59 804), see Fig. 20.

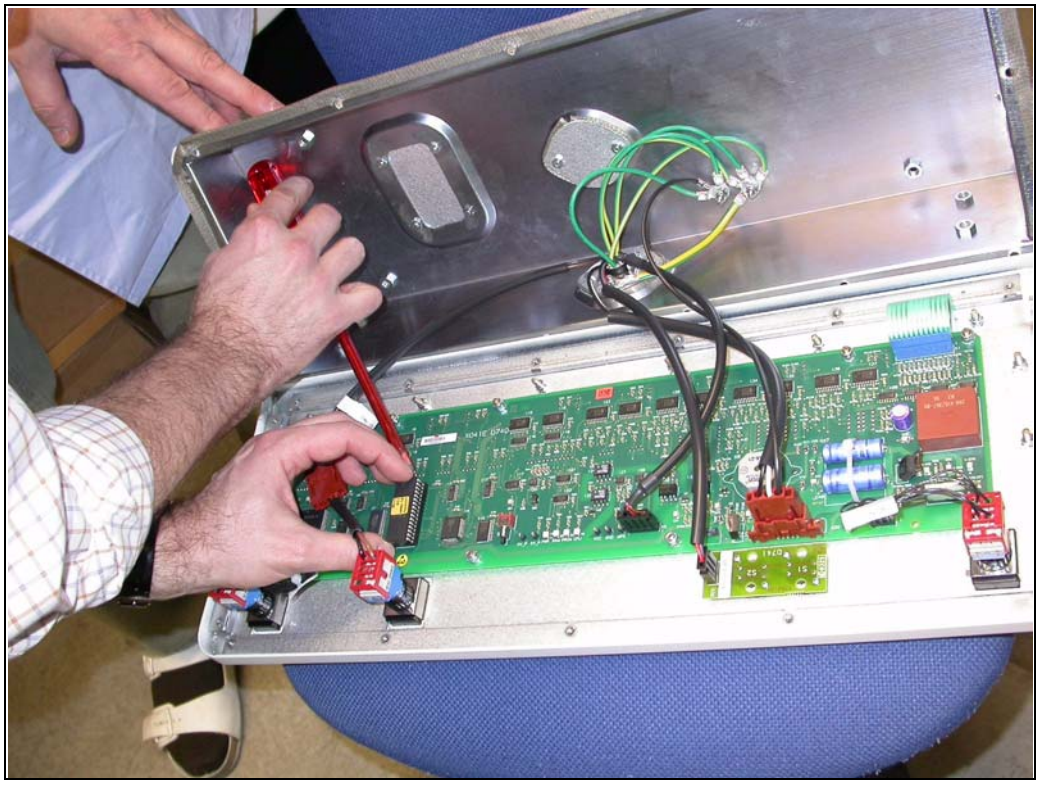

Fig. 20 PCB D740

- Service PC
- Install the Service Software V2.1, delivered on a 3,5 inch floppy under the MatNo.. 066 59 812, on the service PC.

NOTE	**For further service use only the delivered service software V2.1 .**

Parameter settings

- Switch ON the main power line.
- Switch ON the MAMMOMAT Novation^{DR} System, during these work steps the acquisition workstation doesn't need to be switched ON, yet.
- The control console may display the ERROR 821, meaning: "The stand EEPROM has the wrong version number (old or corrupt)". Disregard the message and acknowledge/ purge the same on the control console in the usual manner.
- The service PC is still connected to the stand; reconnect if disconnected.

- Perform "Backup" of both, the stand and the panel (control console) /generator, i.e. "copy installation area to disc" or "copy installation area to floppy". Note down where to on the hard disc this backup data were stored, or attach corresponding label to the floppy.
- Switch OFF the MAMMOMAT Novation DR system from the control console, wait for half a minute.
- Switch the system ON again, the ERR821 shouldn't appear this time.

Checks, adjustments and calibrations

NOTE

In the last few working steps the firmware / software V 1.0 of the MAMMOMAT NovationDR system was changed to the revision level V 2.1. All parameters, which have been previously configured, entered and stored on pertaining places ("installation areas") by the FW/SW V1.0 are present within the system in an unchanged format. EEPROMs, containing such settings, aren't supposed to be replaced in course of this upgrade. Since, however, in course of some work steps the detector has been removed and the connection of the OPDIMA option was made available, following activities have to be performed additionally:

1) Rotation test/check.

2) Calibration/check of the optimized compression for OPDIMA; (or, setting of that parameter to the same value as for the DR).

3) Calibration of the collimator for the radiation beam and the light field.

4) Calibration of the wing difference; (or, setting of that parameter to the same value as for Mo large focus).

5) Disabling film exposure, i.e. the setting of the "Allow film exposure" software switch to OFF.

6) OPDOSE - Configuration of "Auto limits" for both, DR (Digital Radiography) and for the OPDIMA.

7) Check of the grid lines.

8) Calibration of the detector gain.

Rotation Test

- Move the wing in different positions and watch to the cable.
- The rotation of the swivel arm has to stop on position 0°, ± 45°, ± 90° and ± 120°, when OPDIMA® wing is selected.
- The rotation of the swivel arm has to stop on position 0°, ± 45°, ± 90° and + 135°/ - 180°, when Detector wing is selected.
- Installing the wing cover and the bellow.

Checking the OPCOMP function when Opdima wing selected

- Decompress.
- Set the compression force to 20 kg by using the presetting knob and compress.
  The compression movement must be interrupted by OPCOMP before 20 kg is reached, i.e. at 5-15 kg depending on the material used.
- Adapting OPCOMP.

NOTE	**If the factory-set OPCOMP is not to the customer's satisfaction, an adjustment can be carried out with the tautness factors in the "Optimized compression dr" table, see Service Instructions (Software, SPB7-250.816.03...). A lower tautness value will increase the compression force and vice versa. Increase/decrease the tautness factor by e.g. 10 the first time. Let the customer use this setting for at least two weeks before further changes are made.**

NOTE	**OPCOMP has been thoroughly tested by Siemens. If any factors are changed, OPCOMP will no longer be an optimization of compression force and image quality according to Siemens' clinical test.**

Collimator checks

- Checks have to be performed according to the chapter Collimator Adjustments of the corresponding Startup with WH AWS, from System Serial No. 1101 SPB7-250.815.03...

Collimator wing difference Calibration

Select the OPDIMA® wing by moving the detector in the parking position. OP is then displayed on the control console.

- Connect the compression plate simulator and the collimator-mounted plexi phantom.
- Start the service software on the service PC and select:

  Configuration -> Collimator -> Calibration of wing difference

NOTE	**Configuration -> Collimator -> Calibration of wing difference.**

If no precise wing difference calculation is performed, or if you have to start from scratch, you can start with the "large focus/molly" values that have been adjusted with the "Collimator beam calibration".

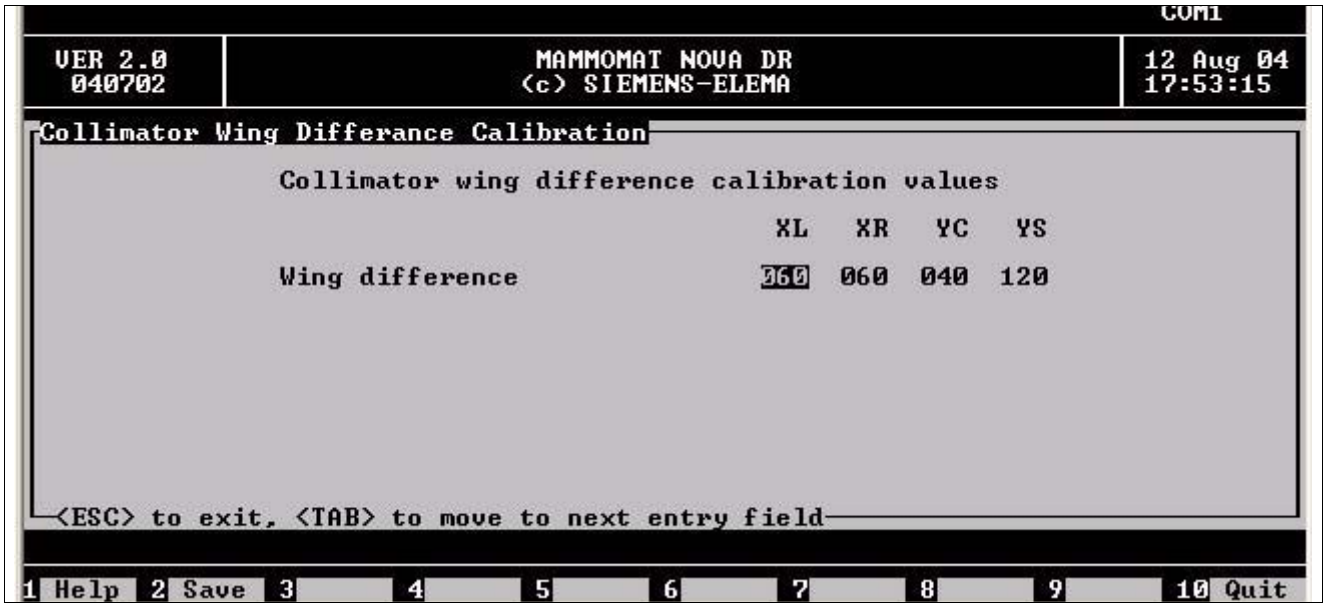
COM1
VER 2.0
040702
MAMMOMAT NOVA DR
(c) SIEMENS-ELEMA
12 Aug 04
17:53:15
Collimator Wing Differance Calibration
Collimator wing difference calibration values
XL XR YC YS
Wing difference 060 060 040 120
<ESC> to exit, <TAB> to move to next entry field
1 Help 2 Save 3 4 5 6 7 8 9 10 Quit

Fig. 21

- Enter the numbers in the table below:
- Narrow the X-ray field so that the edges of the detector will not be exposed to the X-ray and white lines are visible in the image at the edges of the detector. To do this, decrease the YC value and increase the YS, XR and XL values by 5 numbers.
- Make sure a patient is registered and start an exposure.
- Use a magnification of 4 in the application software and go to the edges of the detector. White areas should be visible at all edges of the image. This shows you that the X-ray does not cover the entire detector and shows where the beam really ends.
- Measure the white line thickness at each image edge with the application graphical user interface and adjust the corresponding XL, XR, YC and YS values with the service software.
- Start an exposure.
- Check if the white lines at the edges of the image are gone using a magnification of 4 in the application graphical user interface.
- Save the calibration and Exit from the Service Software.

NOTE

If you see a white thin line on the chest wall when using the magnification.

table, it might be the magnification table itself. Move the magnification table out by approximately 1 mm and try again.

Disable the film exposure

- Connect the Service PC to the MAMMOMAT Stand and start the service software program.
- Go to Configuration -> Miscellaneous -> Allow film exposure and make sure that the Switch is set to OFF Fig. 22.

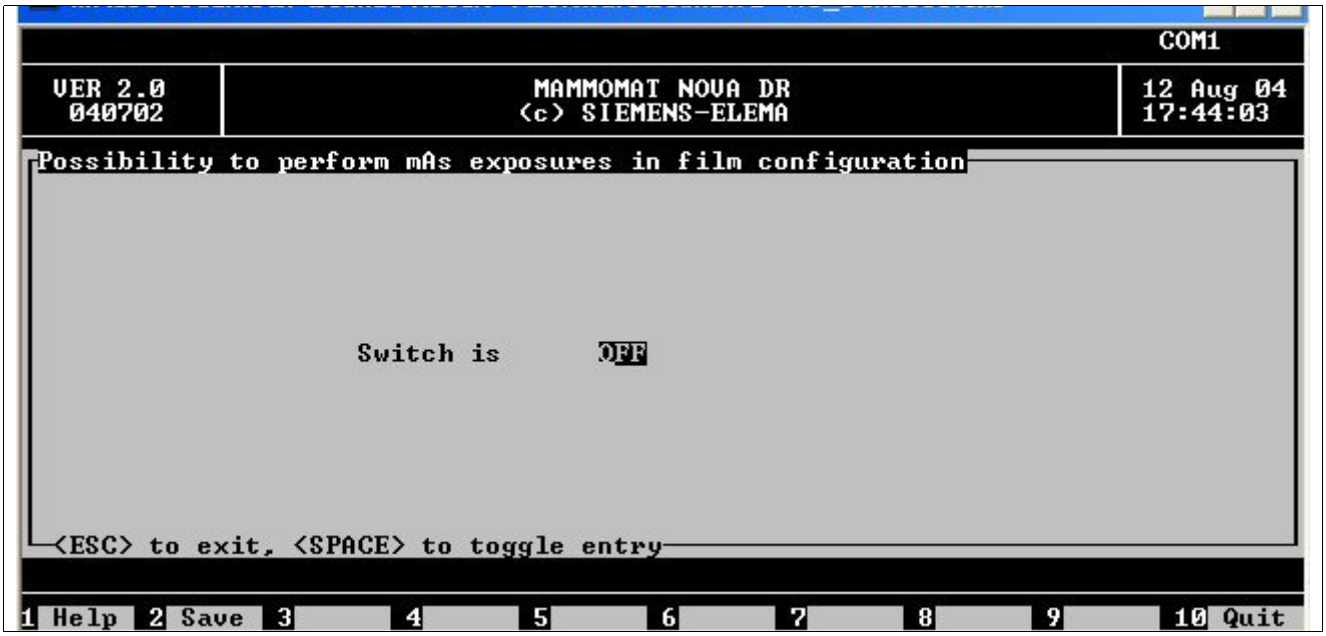

Fig. 22

Checking the OPDOSE for Opdima wing

- Select the Opdima® wing. As a result OP is displayed on the control console.
- Mount the spot 1.0 compression plate.
- Select a thickness of calibration plexi (part no. 65 61 240) that is within the thickness interval of the program to be tested.
- Select AUTO on the control panel.
- Place the calibration plexi on the object table and compress to 6 kg or more.
- Check that the correct program is blinking on the control panel. Select the program by pressing the corresponding program button on the control panel.
- Repeat the procedure described in steps 3-6 for the other programs used.

Grid Lines

- Checks have to be performed according to the chapter Image Quality / Checking grid lines of the corresponding Startup with WH AWS, from System Serial No. 1101 SPB7-250.815.03...

Calibration of detector

- The Detector Gain calibration has to be performed according to Startup with WH AWS, from System Serial No. 1101 SPB7-250.815.03...

QC Test

NOTE	The following Quality Control Manual tests have to be carried out.

- Chest wall missed tissue; (No: 2).
- Collimator assessment; (No: 3).
- Compression plate overlap on the chest wall side; (No: 4).
- Spatial resolution; (No: 5).
- Phantom image quality; (No: 6).
- Detector uniformity; (No: 8).
- Mean glandular dose; (No: 12).
- AEC Image stability and reproducibility, signal-to-noise ratio; (No: 13).
- Ghost image evaluation; (No: 14).
- SNR and CNR measurements; (No: 15).
- AEC testing / AEC Thickness Tracking Test; (No: 16).

Saving the MAMMOMAT Parameters

- Start the service software.
- Select Backup > Copy installation Main menu: area to floppy A:.
- Leave the program with <F10> when the backup is ready.
- Keep the backup floppy with other documentation for the MAMMOMAT Novation^{DR} in question.

Without OPDIMA

- Fix the Generator to the stand.
- Close all the covers
- Check the grounding of the systems. Using the protective ground wire tester, measure the resistance between the protective ground terminal in the stand (Mains input terminal) and all metallic parts of the equipment which the patient/ operator may come in contact with, incl. all object tables. The protective ground resistance must not exceed 0.1 Ω .
- Perform a test exposure with collimator mounted phantom and when everything is working fine turn the system over to the customer.

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Chapter 3	Page 1	Text added
Chapter 4	Page 10	Procedure described more in detail

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